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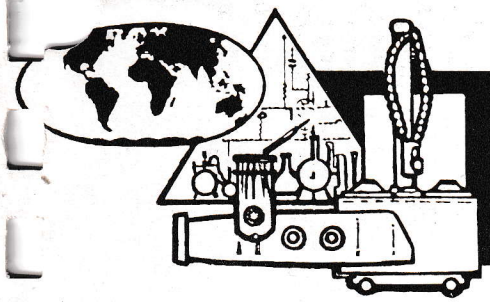
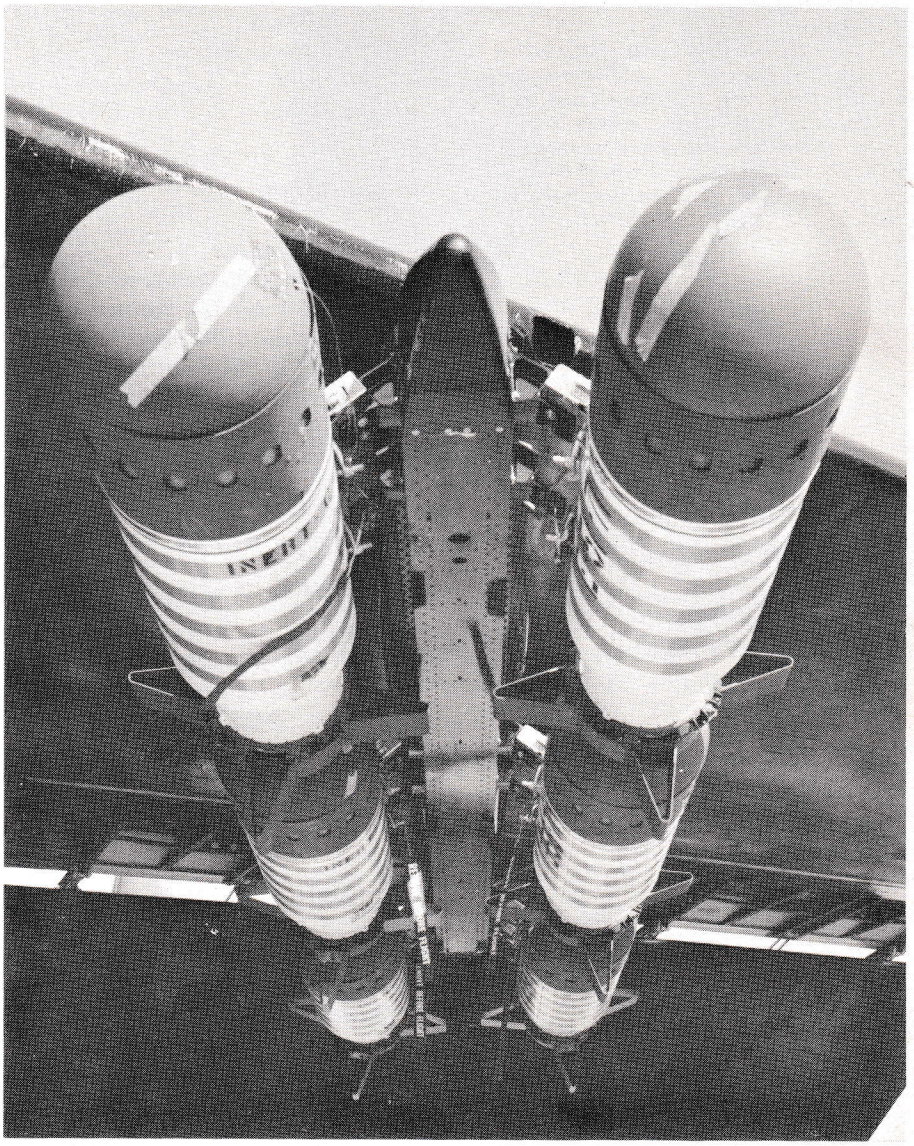


THE MINE AND DEPTH CHARGE

TROUBLESHOOTER



AN OFFICIAL *NAVORD* PUBLICATION

AN OFFICIAL NAVORD PUBLICATION

RADM MARK H. WOODS, USN
Commander, Naval Ordnance Systems Command

The Troubleshooter is an official NAVORD publication which disseminates informative articles pertaining to assembly, testing, safety, configuration, maintenance, and delivery of U.S. Naval mines and depth charges. When the word DIRECTIVE appears as a part of the mine heading of the article, the content that follows contains information requiring action that is mandatory and shall be acted upon promptly. The Troubleshooter issue is your authority for such action.

Troubleshooter is also the journal for the Rudminde Program, a world-wide defect-reporting system, which promotes a high level of readiness in U.S. Naval mines and depth charges. Problems with these weapons are to be reported via NAVORD Form 8500/1 (2-68) to the Naval Mine Engineering Facility as directed by NAVORDINST 8500.3.

CDR EARL L. ROBERTS, USN
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THE MINE AND DEPTH CHARGE

TROUBLESHOOTER

ISSUE 2-71 1 JULY 1971

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COVER

In this view you are under the wing of an Air Force B-52 looking up at six Mines Mk 55 installed on the port side. The mines, twelve total, were flown and dropped during verification of loading procedures. For story and more pictures see page 6.

PUBLISHED BY THE NAVAL MINE ENGINEERING FACILITY, YORKTOWN, VIRGINIA, 23491

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CHANGE OF COMMAND CEREMONY:

COMMANDER ROBERTS NEW OIC AT YORKTOWN FACILITY

COMMANDER Earl L. Roberts became the Officer in Charge, Naval Mine Engineering Facility, 30 July 1971, at Yorktown. He assumed his new duty at a Change of Command ceremony at the Naval Weapons Station when he relieved Commander H. Almonrode who served the Facility as Officer in Charge since August 1967. Commander Roberts comes to the Facility from duty as Project Officer, Naval Ordnance Systems Command Headquarters, Washington, D. C.

Commander Almonrode leaves his duty as OIC of the Facility to retire from the Naval Service and enter the teaching profession. Captain J. E. Myrick, who was guest speaker at the change of command ceremony, representing NAVORDSYSCOMHQ, presented Commander Almonrode with the Naval Commendation medal for meritorious service during his tour as OIC at NAVMINENGRFAC. The citation was signed by the Chief of Naval Operations, Admiral Elmo R. Zumwalt, Jr. for the Secretary of the Navy. Captain Myrick is head of Mine and Special Warfare Systems, Division, Naval Ordnance Systems Command, Washington, D. C.

The citation reads, in part:
Commander Almonrode displayed untiring effort, superior managerial ability, and exceptional leadership in directing the employment of in-service mine engineering agency resources. He also was instrumental in the Facility's development of a fleet-oriented attitude to ensure high caliber engineering and management analysis of fleet problems. Under Commander Almonrode's direction, implementation of an Integrated Logistics Support Program for mines was finalized; optimum weapon-to-delivery agent readiness was ascertained through liaison with interface agencies; and the Facility realized substantial manpower and financial savings through an active Value Engineering Department. His unique foresight into problems and requirements inherent in engineering support of the mine program assured the Navy of increased weapon system management capability.

Commander Almonrode, departing OIC, reads his orders at change of command ceremonies. Commander Roberts is seated behind him.

MINES ARE HIS BUSINESS

Commander Earl L. Roberts, born in Alta Vista, Kansas on 13 December 1926, enlisted in the U. S. Navy 22 February 1944, and received his commission as Ensign, USN, on 2 July 1957. He was a November 1957 graduate from OCS (LDO Class L-5), Newport, Rhode Island, and a recent graduate of the Navy Shore Station Management Systems Course, U.S. Naval Postgraduate School, Monterey, California.

CDR E. L. ROBERTS

Commander Roberts has served in the following stations and commands since volunteering for active duty in 1944; NAS Jacksonville; NAAS San Diego; Aircraft Patrol Squadrons 121, 102, 116, 61; Fasron 110 (as Air Gunnery School Instructor); NAS Kwajalein (as crew member, PBM5A aircraft); USS Suisun Bay (AVP-53) (as petty officer in Charge of AUW Shop); Naval Schools Mine Warfare, Yorktown, Va. (two tours - one as instructor in basic electronics and mines, one as minefield planning instructor); COMINEPAC (as supervisor of mine preparation and mine evaluation teams), USS Bon Homme Richard (CVA-31) (pre-commissioning detail); Fasron 118 (as Chief in charge of Mine Shop); Drill Mine Preparation Facility (as Officer in Charge, NAD Oahu (as AUW Officer); NAD Hawthorne (as Ordnance Production Officer, COMINELANT Staff (as Mines Officer).

Commander Roberts comes to the Naval Mine Engineering Facility, from duty as Project Officer, Naval Ordnance Systems Command Headquarters (ORD-543). He is ninth in a line of NAVMINENGRFAC Officers in charge since it was founded in 1956.

FLEET LIAISON SHOPTALK

A COLUMN OF OBSERVATIONS

LOGISTICS, ANYONE?

A new billet (Supply Logistics Officer) has been established at the Naval Mine Engineering Facility. The duties and responsibilities of this billet are being carried out by LCDR George F. (Mike) Vaughan of the Supply Corps.

LCDR George F. Vaughan

LCDR Vaughan's previous duty was that of Supply Officer on board the USS CHILTON(LPA-38). Prior to that he has served in supply billets at DSA, Vietnam, and various other CONUS and EXCONUS duty stations.

LCDR Vaughan's duties and responsibilities at NAVMINENGRFAC will consist of procurement, inventory control, status of current and future budgets, and other supply functions as assigned by the Officer in Charge.

Although LCDR Vaughan is not assigned to the Fleet Liaison Department, he will gladly give Fleet-oriented assistance in answering questions you may have about supply or logistics. During the time LCDR Vaughan is settling into his new duties you may address any questions for him to a Fleet Liaison Officer.

LCDR Vaughan's knowledge in his field and past experience has already been an asset to NAVMINENGRFAC. We sincerely welcome him into the Mine Community.

STILL A PLACE FOR RUDMINDES

With the introduction of the B- and C-Test Form channel for reporting defects a large part of the responsibility for defect reporting that once rested with the Rudminde is removed. The note that follows the instructions on the reverse of the forms makes this clear. Heed this note that limits the Rudminde requirements and save useless paper work.

The new report form gives a clearer overall picture, one that is not obscured by the former Rudminde-type report. On a given occasion, for example, 50 components of one Mk and Mod are tested and 10 fail. The Rudminde would be read as showing a 20 percent failure rate. Later 50 more of the same components are tested, none fail and no Rudminde is submitted. Consequently we have no knowledge of the 50 additional good ones which bring the overall failure rate down to 10 percent. Also, identical defects can easily be obscured by narrative-type reporting which will vary in as many different ways as there are people reporting.

While it is true that a large area of defect reporting that was exclusively reported by NAVORD Form 8550/1 has been transferred to the B- and C-test report forms, several areas remain subject to reporting by Rudminde. These areas include components that are not subject to Class B or C testing, such as hardware, software, handling equipment, test sets, safety, procedural information. Also some deficiencies do not lend themselves to a coded reporting system but require a narrative explanation only possible by Rudminding them.

Items that are not Class B or C tested may later be included on the B and C test forms and there is a separate reporting procedure being formulated for test sets, but this is all for the future.

No longer will disposition instructions be included in Rudminde replies. The Rudminde disposition instructions will be included on the disposition form issued by NAVMINENGRFAC for reject equipment reported on B test forms. This does not affect the depots disposition reporting procedures as they are not involved in the fleet-oriented B- and C-test program.

This is a good place to remind you of a 3-69 issue Shoptalk item where it was stated that Rudmindes related to policy matters will be returned unresolved so that proper channels will be used for such matters. This still applies, but don't let these prohibitions make you reluctant to submit a Rudminde. If you have doubts, by all means Rudminde.

Rudmindes and their answers are also being seen by the Fleet Liaison Officers in order to give them a look at fleet-oriented problems and insure that all questions are answered. If you are not satisfied with the answer you receive let us know.

INTERFACE RESPONSIBILITIES

NAVAIR and NAVORD are running extensive tests on mine release from aircraft bomb racks. It is intended that these tests will result in an arming wire and aircraft solenoid combination that will increase the reliability of our mine weapon system. However, no matter how reliable the solenoid/arming wire systems get, the mines must still be loaded properly to ensure correct release from the aircraft.

Back in Troubleshooter 3-64, an article was written on the responsibilities of minemen and aviation ordnancemen when it comes to loading mines on aircraft. The article states the MN rates are responsible for delivering the mine to the flight line ready for AO rates to take over for loading on the aircraft. This is as true today as it was then.

The FLEET LIAISON STAFF

Naval Mine Engineering Facility, Yorktown, Virginia 23491

The FL Desk responsible for this Shoptalk column stands ready to assist minemen everywhere with their problems, large and small.

Lt. Paul W. Hanks, Department Head
CWO B. E. Wharton
CWO O. G. Smith
CWO P. E. Dechene
CWO R. W. Padgett

COMMERCIAL (703) 887-7336 / 887-7337

AUTOVON 953-7336 / 953-7337

Recently, however, there have been instances where MN rates have been observed assuming some duties of the AO rates. Perhaps the reason for this is that many minemen have been involved in more mineloading exercises than some aviation ordnancemen and are concerned with the proper loading to the point where they would rather do it themselves. This concern is understandable. Through a lot of long hours and hard work minemen have watched over, maintained, and raised the mines from an immature Configuration Delta to an adult Configuration Alpha and don't want to see all their time and effort wasted by an improperly-rigged arming wire or an inoperative solenoid.

There is nothing wrong with being concerned with all phases of a mine's life but there has got to come a time when the apron strings must be cut. That time is when the aviation ordnancemen receive the mine for loading. Aviation ordnance loading equipment, bomb racks, and solenoids are just not our bailiwick.

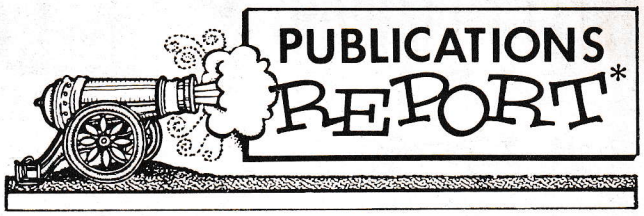
We're not saying the minemen's responsibility completely ends at the flight line. Any mineman with a half an ounce of pride in his work is not going to allow the mines to be loaded improperly. If possible, an experienced mineman should remain on hand to advise and assist.

The minemen must remember that although AOs may not be thoroughly experienced in the loading of mines they are experts in their own field and have loaded all different types of stores on their aircraft many times before. He must be careful not to impose on a crew, inexperienced in the loading of mines, methods of loading that are not in the loading check list. Of course, his main purpose will be to advise and assist the loading crew on anything that involves the mine components. Any part of the loading phase that involves the mine and its component parts he feels is not being performed correctly, should be brought to the attention of the person in charge of the loading crew.

The mines should be thoroughly inspected prior to flight. Make sure there are no missing or loose E-rings, that all safety pins, and shipping washers have been removed, that arming wires are installed and routed properly, that Fahnestock clips are installed where required, and that the Mk 66 Control Unit is properly set. If any of the above, other than the missing or loose E-rings and shipping washers are observed, inform the aviation ordnancemen and let them correct it. If shipping washers have not been removed, or if E-rings are loose or missing, it is the responsibility of a mineman to correct it. Minemen have no business actually performing any of the loading functions as they have not been qualified or certified to do so as required by OPNAVINST 3571.3.

The new loading check lists now being prepared for publication contain instructions stating the aircraft solenoids must be checked prior to loading. If this is not done, it should be brought to the loading crew's attention that it is required. The most recent FSMT would have had five duds attributed to faulty bomb racks had not the solenoids been checked.

If we cooperate and assist on the flight line as any good Navy team should, we'll have a live field and not one that has mines in it that are doomed to be duds before they hit the water.



Recently Distributed

OP 1452 VOL 2 REV 4 CH 3: Adds B-test for Arming Device Mk 10, 11, and Depth Control Unit Mk 78

OP 1892 REV 3 CH 1: Shifts the requirement for visual-clock inspection to extender-installation job sheet

OP 1935 VOL 1 REV 2 CH 3; OP 1935 VOL 2 REV 1 CH 1; OP 1935 VOL 3 REV 1 CH 1: Adds Assembly configuration instructions and maintenance requirements for Mine Mk 27 Mods 2 and 3

OP 2363 VOL 1 REV 1 CH 3; OP 2363 VOL 2 REV 1 CH 1; OP 2363 VOL 3 REV 1 CH 1: Adds assembly configuration instructions and maintenance requirements for Mine Mk 27 Mods 4 and 5

OP 3232 REV 0 CH 1: Adds operational assembly chart and restricts use of arming wire to Mk 4 Mod 1 only

OP 3504 VOL 7 REV 6: Deployment References

Released to Print

OP 1765 REV 4 CH 1: Shifts the requirement for visual-clock inspection to extender-installation job sheet.

OP 3388 VOL 1 REV 1 CH 2: Add leakage test apparatus qualification procedures

OP 3504 VOL 5 REV 2 CH 1: Add test equipment allowance

In Final Preparation

OP 1452 VOL 2 REV 4 CH 4: Adds B-test for Anchor Mk 56 Safety Device

OP 1452 VOL 4 REV 4 CH 1: Alters B-test for CD-8, CD-10, CD-14, and CD-17

OP 1516 REV 1 CH 4-1: Adds Battery Mk 33 Mod 1

OP 3232 REV 0 CH 2: Adds Fairings Mks 19, 20, 21; Mine Preparation Check list for B-52

In the Works (in order of intended release)

OP 3504 VOL 7 REV 7: Deployment References

OP 2608 VOL 1 PT 1 REV 2 CH 1: Adds Fairings Mk 19, 20

OP 2608 VOL 1 PT 2 REV 2 CH 2: Adds Installation Procedures for Fairings Mk 19, 20

OP 2572 VOL 1 REV 3 CH 1: Replace Postal Changes

OP 2718 VOL 1 REV 2 CH 1: Replace Postal Changes

OP 3379 VOL 1 REV 1: Maintenance Guide

OP 1860 VOL 6 REV 0 (Secret): Adds Sets Mk 435-0, Mk 436-0, and Mk 450-0

OP 1452 VOL 3 REV 4 CH 2: Updates color code, and stenciling requirements

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* *This report is designed to keep readers abreast of what is going on behind the scenes concerning technical manual projects. It is not designed to compete with OP 3504 VOL 7, which is the only list of technical manuals, revisions, and changes authorized for fleet use.*

HOT STUFF

An open letter

ALL MINEMEN:

Some of you chaps are bypassing NAVMINENGRFAC, and at the same time your old friend Chief B. Arnacle Butt, in solving your problems. Resourcefulness is commendable but when you fail to use the machinery that is designed to help you, you are not only shortchanging yourself--you are throwing down the entire team. It's not professional!

There have been too many examples of this circumstance but here is one that drives the point home. The technical problem that evolved, but was not reported to the Facility, concerned the Battery Mk 33. It seemed that a short from battery to case developed after several maintenance charges. The site involved insulated battery grounds from the case by using tape which was all to the good but there was no report made as a follow up.

Later--too much later--the problem was uncovered during a visit by a Facility certification team. But in the meantime the facility, not being aware of this deficiency, bought 250 new batteries at a cost of $1,200 each, complete with the defect only known to those who had experienced it.

The Fleet is to be commended for its ingenuity in devising methods to enhance mine readiness but how can we applaud without catching the act?

Silence is not always golden.

Share!

B. Arnaclebutt

Drilling drain holes

MK 52-1, 2, 3, 4, 5, 6:

Dear Chief Butt:

Request permission to drill 1/4-inch drain hole in spoiler of Mine Cases Mk 52 Mod 0 with three digit serial numbers. These cases have a rolled edge to which spoiler is welded. This method allows water to collect behind spoiler resulting in an abnormal build-up of rust which is difficult to clean in such a confined space. The hole would drain off this excess water and ease the problem of maintenance.

DHA

Dear DHA:

It is safe to drill such a drain hole only if a hand-operated breast drill is used at slow speed and that strict supervision is exercised to insure that the drill does not enter the mine case. Under no circumstance will use of a power drill be permitted. The procedure, which should be required only on case within the serial range 1 through 3990, follows.

Rotate mine case on weapons dolly until suspension lugs are at 6 o'clock position, then check for presence of extra cresent-shaped piece welded to mine's slant nose between spoiler and case 9 o'clock to 3 o'clock position. If present, check for 1/4-inch drain hole in spoiler, 5/16-inch from rear edge of spoiler at 12 o'clock position. If drain hole is not present, drill one as follows:

- ▶ Using hand-operated breast drill, set at low speed, drill 1/4-inch hole in spoiler, 5/16-inch from rear edge of spoiler at 12 o'clock position. Do not drill into mine case.
- ▶ Remove any nicks or burrs from edge of hole and paint bare metal surfaces per OP 1452.
- ▶ Return mine case to original position, suspension lugs up.

B. Arnaclebutt

Old age and the BA-340

MINES MK 52/55-3, 4, 6:

Dear Chief:

We have been finding some BA-340/U batteries that are not passing the insulation leakage test after charging. Those that fail appear to be those that have been stored uncharged over the longest period of time.

FTB

Dear FTB:

This effect of old age on uncharged BA-340s has been recognized which is the reason change 2-3 to OP 1452 VOL 1 was made. This change requires an insulation resistance test be performed on the battery prior to charging. No sense in wasting time charging a battery that is a reject before you start.

Going one step further in maintaining stockpiles of this battery in the highest degree of readiness a strict selection criteria for the BA-340 will be observed as follows:

▶ When selecting BA-340/U batteries from dry storage for subsequent charging, for any use, apply the FIFO principle (first-in/first-out).

▶ For those batteries which already have been charged and then stored, apply the LIFO principle (last-in/first out) for service use or FIFO principle for drill or MRI (Mine Readiness Inspection) use.

B. Arnaclebutt

Reversed polarity

MINES MK 25/27/36:

Dear B. Arnacle:

Test Set Mk 137 has a habit of blowing F1 fuses frequently during Class B tests of Control Boxes Mk 13 or 15. There should be a precaution that would eliminate this erratic behavior, annoying to say the least.

RBV

Dear RBV:

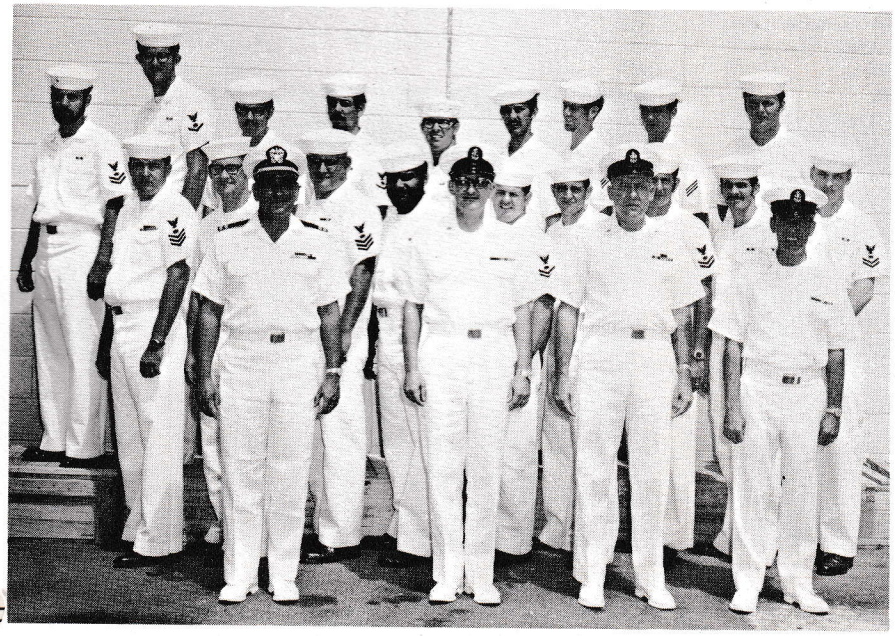
The trouble that causes the F1 fuse in the Test Set Mk 137 to blow all starts with the incorrect hook-up of Cable CA-656 to the 6- 12 volt dc power source before testing of the control boxes begins. Which is to say the reversal of the leads for the negative terminal with the positive 6- or 12-volt terminals on the external batteries.

Defect analysis of control boxes subjected to this reversed polarity show that cams A and B of the contact assemblies of Motor Delay MD-10 have been distorted to such an extent that they were inoperable, all because the motor ran backwards. This causes the cam followers on the contact blades to jam on the non-tapered edges of the cam notches stalling the motor and distorting or breaking the blades. In some instances the increased current drain due to the installed motor is great enough to blow the F1 fuse in the test set.

The possibility of this happening is considerable . . . enough, for sure, to warrant all hands checking carefully to prevent it.

B. Arnaclebutt

DETACHMENT AT NAHA



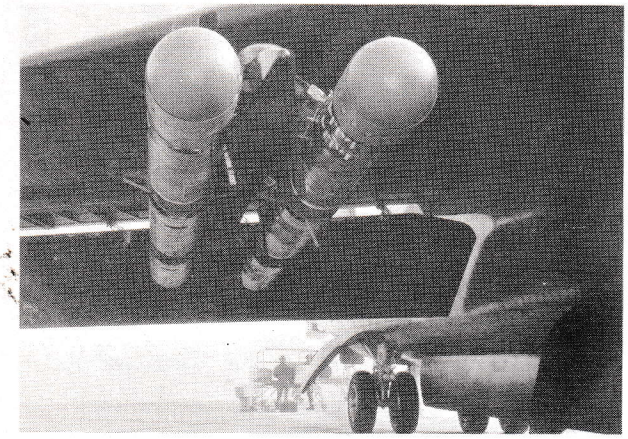
The Mine Maintenance Detachment at Naha, Okinawa, whose home station is NAVMAG, Guam, poses for a recent photograph. They are, from the left:

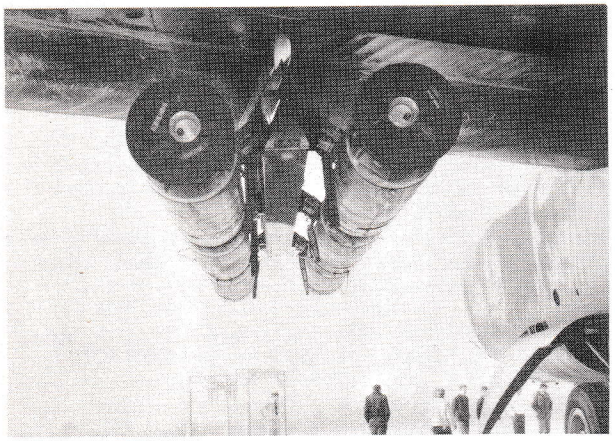
Front row: LT B. Benintende, OINC. MNCM M. Konieczka, MNC J. B. Allen, MNC F. D. Bartram.

Second row: MN1 J. H. Coers, MN1 A. R. Higgins, MN1 J. E. Temple, MN2 J. M. Sandoval, MN2 R. D. Lord, MN2 F. D. Grisham, MN1 J. P. Hutson, MN2 G. L. Gray, MN2 L. R. Smith.

Third row: MN2 K. F. Braam, MN3 D. R. Vaughan, MN3 F. R. Solberg, MN3 W. C. Holloway, MN3 J. R. Harris, MNSN M. R. Ball, MNSN D. Deal, MN3 W. A. Helgerson, MNSN R. G. Risi.

HOW B-52 CARRIES SIX ON A BEAM



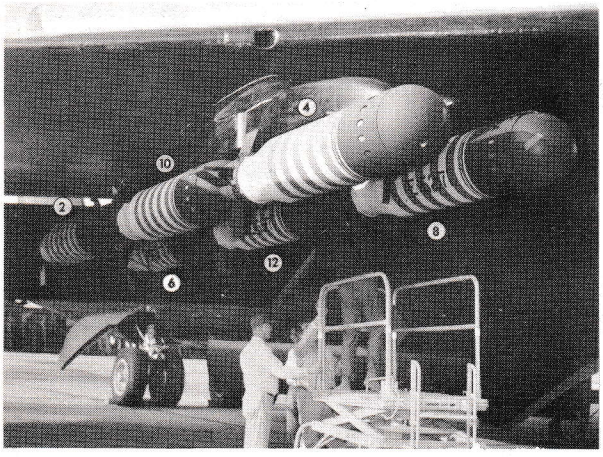


Mk 56 mines can be externally loaded six to port and six to starboard but only if the Fairing Mk 21 is used on the forward mines as shown. If all mines were faired there would be no room for them on the beam. One mine provides a streamlining aspect for all in the group. The bottom picture shows a drag plate in lieu of fins on the rearmost mines.

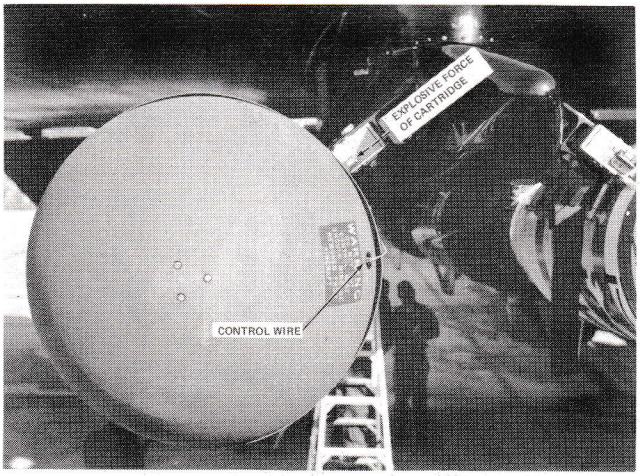
EXTERNAL (wing) loading and drop demonstrations were conducted with the USAF B-52D aircraft using Mk 55 and Mk 56 mines equipped with Fairings Mk 20 and Mk 21. No unsurmountable problems were encountered but fairings had to be omitted in the assembly of all but the forward two Mk 56 mines so they would fit on the aircraft's wing beam. The loading demonstration was conducted at the Boeing Company, Wichita, Kansas, and the drop demonstration at Elgin AFB, Florida. In the flight from Kansas to Florida no undue vibrations were noted due to the lack of Mk 21 fairings on the aftermost Mk 56 mines. The Mk 55 mines fitted on the beam with a Mk 20 fairing on each mine.

The need for some adjustment in the pattern of rigging Mine Mk 55 control wires was revealed in the loading demonstration. It was decided that the fairing's control-wire would not be rigged on the mine by the mine personnel, but will be coiled and taped to the mine case in the mine shop. Air Force personnel will be responsible for rigging the fairing's control wire. Since the center and after station Mines Mk 56 do not have fairings or fins installed, the mine assembly personnel will leave the drag plate on the aftermost face of the Mk 28 parapack housing of these mines. The aftermost face of the Mk 28 parapack has three grooves so that the control-unit arming wire can pass under the drag plate before being attached to the aircraft. It was also agreed that the anchor arming wire would be preshortened to 14 inches by mine personnel for beam loading on this aircraft. The 14 inches is measured from where the wire emerges from the anchor to the tip of the swivel eye.

The B-52 is also capable of carrying a mine load internally. One Mk 55 mine was dropped from a bomb-bay rack at Elgin AFB without incident as part of a release-sequence test.



Six Mines Mk 55, each one complete with its Fairing Mk 20, will fit on a B-52 beam. The mines are numbered in the order they will drop from the starboard wing. Odd numbers are reserved for the port stations.



Mines are hung at an angle. Strictly speaking they do not drop but are blown from the MAU 12 rack at an angle by explosive cartridges and then drop. The control wire is pulled at the same time and the fairings retract.

SWITCH IDENTIFICATION FOR TEST SETS MADE EASIER

Mine activities which are authorized to replace test-set parts under the Phase-G program have found some difficulty in identifying toggle switches used in the test sets they hold. This was because identification was limited to MMCs and manufacturer's parts numbers not readily matched to military specs and to Federal Stock Numbers. In recognition of this difficulty NAVMINENGRFAC technicians reidentified these switches by MS numbers.

Until such time as this information can be incorporated into the appropriate publications here is a list of toggle switches by test set, MMC and FSN. In addition the switches are identified by their functional description such as "SPST," and include their schematic designation. All switches listed are authorized for replacement at the intermediate maintenance level.

TEST SET MK-MOD	SCHEMATIC DESIGNATOR	MMC	FSN 9N5930-
3-2	S5 (SPDT)	4T36090	-655-1523
	S6 (SPST)	4T37090	-655-1514
26-1	S11 (SPST)	4T11106	-655-1514
-2	S2 (DPST)	4T59108	-655-1575
(W/PS 20-1)	S8 (DPST)	4T59108	-655-1575
	S11 (SPST)	4T68108	-655-1514
41-1	S1 (3PST)	4T32120	-655-1576
	S2 (SPST)	4T33120	-655-1522
	S3 (DPDT)	4T34120	-615-7882
	S4 (SPDT)	4T35120	-655-1523
65-1	S2 (DPDT)	4T34126	-615-9376
75-1	S3 (DPDT)	4T13138	-655-1508
	S6 (SPST)	4T12138	-655-1514
-2	S3 (DPDT)	4T36140	-655-1508
95-2	S1 (4PDT)	4T42146	-615-7883
96-1	S4 (DPST)	4T30148	-655-1507
127-4	S2 (DPST)	4T74160	-685-9521
	S4 (DPDT)	4T76160	-615-7880
	S5 (SPDT)	4T77160	-655-1517
	S6 (SPDT)	4T78160	-655-1515
	S7 (DPST)	4T79160	-655-1575
	S8 (DPDT)	4T80160	-577-2285
137-1	S2 (DPST)	4T31166	-655-1507
	S4 (SPDT)	4T33166	-655-1513
	S5 (DPST)	4T31166	-655-1507
	S6 (SPST)	4T34166	-655-1580
177-0	S1 (DPDT)	4T29170	-577-2285
	S2 (SPDT)	4T30170	-655-1515
	S6 (SPDT)	4T30170	-655-1515
204-0	S5 (SPDT)	4T52180	-655-1517
	S6 (SPST)	4T53180	-655-1522
	S7 (DPST)	4T54180	-685-9521
217-0	S2 (SPST)	4T11190	-526-0587
	S4 (DPDT)	4T12190	-615-7880
-1	S2 (SPST)	4T89188	-526-0587
	S4 (DPDT)	4T91188	-615-7880
237-0	S2 (SPDT)	4T11194	-655-1923
239-2	S3 (SPDT)	4T36199	-655-1518
	S4 (DPST)	4T37199	-655-1507
	S5 (SPST)	4T38199	-526-0587
	S6 (DPST)	4T39199	-661-0998
246-1	S3 (DPDT)	4T41200	-655-1508
	S4 (SPDT)	4T42200	-655-1517
	S5 (DPST)	4T43200	-615-7880
250-1	S2 (SPST)	4T40202	-655-1514
	S9 (SPDT)	4T45202	-655-1518
254-0	S1 (SPST)	4T32206	-655-1514
	S2 (SPST)	4T33206	-655-1522
	S3 (SPDT)	4T34206	-655-1517
	S4 (DPDT)	4T35206	-615-7882
263-1	S5 (SPST)	4T47210	-655-1522
	S6 (SPST)	4T47210	-655-1522
	S7 (DPST)	4T48210	-661-0998
264-1	S1 (SPDT)	4T92214	-655-1923
(W/PS 93)	S2 (DPST)	4T93214	-661-0995
	S4 (SPDT)	4T92214	-655-1923
	S5 (SPST)	4T92214	-655-1923
	S6 (SPST)	4T92214	-655-1923
	S7 (DPDT)	4T95214	-655-1508
	S14 (SPST)	4T94214	-615-7896
	S18 (DPDT)	4T95214	-655-1508
265-0	S3 (SPDT)	4T74216	-655-1517
	S5 (SPST)	4T76216	-526-0587
	S6 (DPDT)	4T77216	-655-1508
-1	S3 (SPDT)	4T14217	-655-1517
	S5 (SPST)	4T15217	-526-0587
	S6 (DPDT)	4T16217	-655-1508
	S8 (SPST)	4T12217	-655-1521
266-0	S3 (SPST)	4T13218	-615-7896
	S4 (DPDT)	4T11218	-655-1508
	S6 (DPST)	4T12218	-655-1507
-1	S3 (SPST)	4T34220	-615-7896
	S4 (DPDT)	4T32220	-655-1508
	S6 (DPST)	4T33220	-655-1507
303-0	S2 (4PDT)	4T19232	-615-7879
305-1	S1 (3PST)*	4T15234	-504-6068
316-0	S1 (4PDT)	4T38238	-615-7879
330-0	S2 (SPST)	4T24240	-526-0587

*This switch is the power switch for the Motor Generator Mk 2 Mod 0, a part of test set Mk 305 Mod 1.

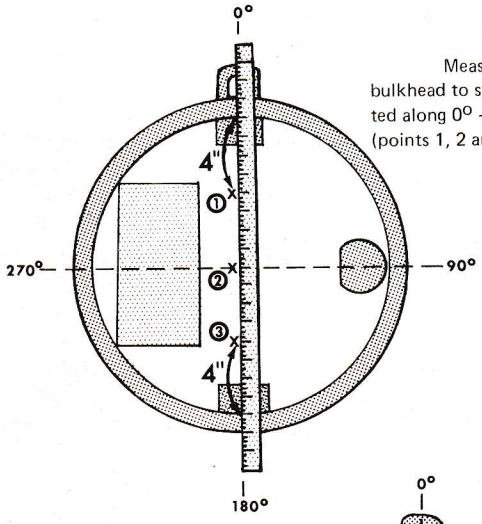
Continued on page 8

SCREEN FOR BULKHEAD BULGE

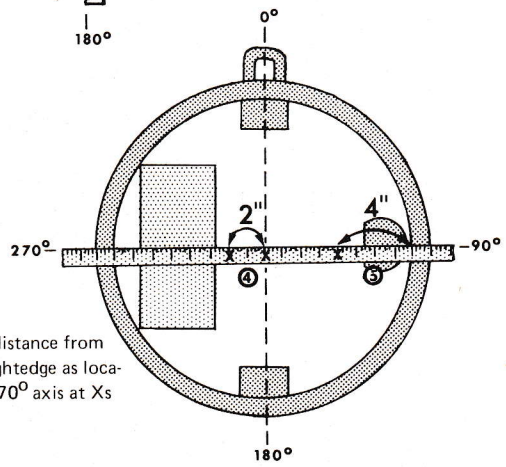
MINE MK 52-1, 2, 3, 4, 5, 6:

Reports received by the Naval Mine Engineering Facility indicate that screening which was directed in 1966 has not been satisfactorily completed. This screening was to have been performed on cases manufactured by Conco Engineering Works (Contract N600 (19)59977) with serial numbers from 3991 through 5270. The purpose for screening is to eliminate those cases in which stresses built into the bulkhead at manufacture caused the bulkhead to bulge into the instrument compartment when the mine case was loaded. Cases with warpage when assembled cause pinching of the instrument cable between instrument rack and tail cover, and, in extreme cases, failure of the seal on the tail cover.

In order to identify these cases and prevent continued damage to cables, stocks are to be screened, during next maintenance cycle, when upgrading, or during preparation for shipment of mine cases, as described below;



Measure distance from bulkhead to straightedge as located along 0° - 180° axis at Xs (points 1, 2 and 3).



Measure distance from bulkhead to straightedge as located along 90° - 270° axis at Xs (points 4 and 5).

Units requiring screening may be identified as follows:

▶ No fins on the outside of the instrument compartment.

SWITCH IDENTIFICATION

Continued from page 7

TEST SET MK-MOD	SCHEMATIC DESIGNATOR	MMC	FSN 9N5930-
335-0	S1 (DPDT)	4T11242	-615-7880
	S2 (DPDT)	4T12242	-577-2285
336-0	S2 (DPDT)	4T11244	-615-7880
	S6 (SPST)	4T12244	-526-0587
340-0	S3 (DPDT)	4T73246	-615-7880
358-0	S1 (DPDT)	4T11250	-615-7880
406-0	S1 (4PDT)	4T39254	-615-7879
407-0	S2 (4PDT)	4T91256	-615-7879
	S6 (SPST)	4T90256	-655-1522
	S7 (SPDT)	4T92256	-655-1515
408-0	S2 (4PDT)	4T93258	-615-7879
	S3 (DPDT)	4T94258	-615-7880
POWER SUPPLIES			
20-1	S1 (DPST)	4P56002	-655-1507
93-0 (W/TS 264)	S1 (DPDT)	4P47004	-655-1508
	S2 (DPDT)	4P47004	-655-1508
94-0 (W/TS 268)	S1 (DPST)	4P42010	-655-1575
111-0	S1 (DPST)	4P38012	-655-1507
	S2 (DPST)	4P38012	-655-1507
-1 (W/TS 340)	S1 (4PDT)	4P50014	-655-1581
	S2 (DPST)	4P51014	-655-1507

▶ Letters CEW stamped on the periphery of the tail flange.

▶ Serial number stamped on the periphery of the tail flange in the range 3991 through 5270.

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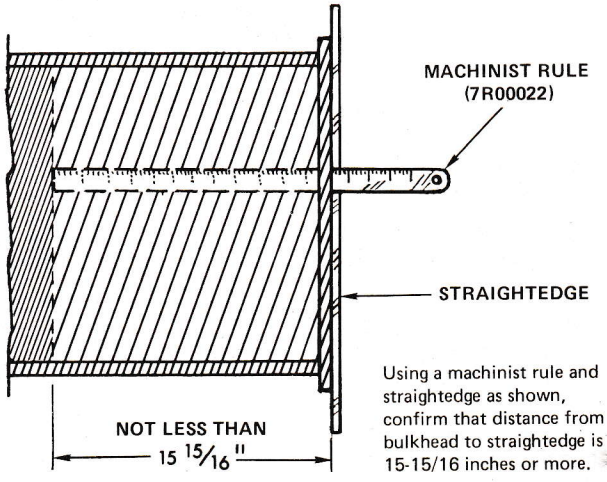


Using a machinist rule and straightedge as shown, confirm that distance from bulkhead to straightedge is 15-15/16 inches or more.

Do You do this Job Right?

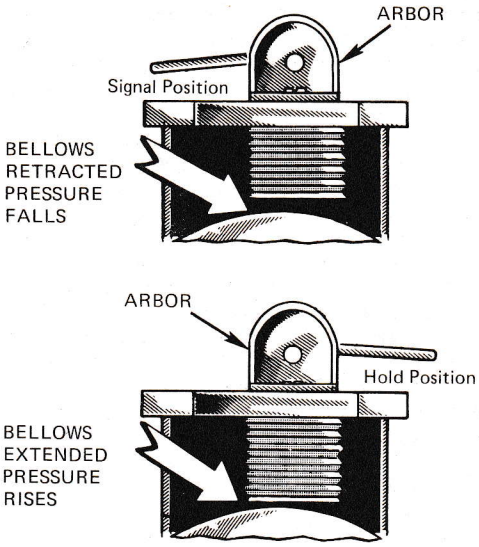
TEST POT IN REVERSE

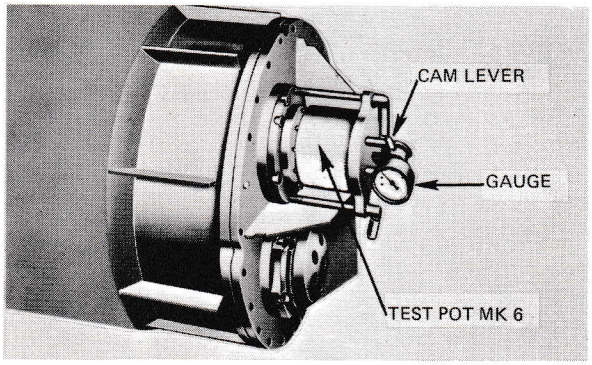
MINES MK 52/55-3, 4, 6:

Mine shops getting erroneous results when using the Test Set 263 with Accessory Set Mk 10 in the C-test of Mines Mk 52/55-3, 4, and 6 are probably using Test Pots Mk 6 that have been assembled in a way that allows the cam to operate in reverse.

When the cam position is reversed and the cam lever is swung to the SIGNAL position the extender rod in the pot is pushed down, extending the bellows so that the lever is actually in the HOLD position, and vice versa. The outcome is that no understandable test results are obtained.

Mis-assembly could have happened in two ways. The arbor that must be removed to clear the gauge when it is unscrewed may have been replaced 180° out. This is possible because the fastenings are symmetrical. To correct, take the arbor off, turn it around, and secure as it should have been in the first place.





TEST POT ON MINE, CHECK GAUGE PRESSURE

The second possibility is that the cam and cam lever may be reversed in the arbor. When this has happened you cannot hear the clicks that tell when the detents are operating--because the detent holes and detent pin are not on the same side, the side away from the gauge. To correct, remove the C-ring that holds the cam shaft, move the shaft, then lift out the cam and turn it around. When you lift the cam watch out for the spring-loaded detent pin. It falls out easily.

It follows that when reassembling a test pot, you should always check its operation to verify it has been put together properly. Swing the cam lever back and forth, and observe the bellows. If it is extended in the HOLD position and retracted in the SIGNAL position it is assembled correctly. Otherwise it is not.

When the pot is assembled over the pressure detector on the tail of the mine, before starting a test, always make sure the gauge on the pot shows 9 to 10 psi for HOLD position, like it says in OP 2608, then swing the cam lever to SIGNAL and make sure the gauge shows a decrease.

If it does, you're in business. If not, release pressure from the pot and correct the cam.

BULKHEAD BULGE *Continued from page 8*

Place a straightedge across the mine case tail flange and using machinists rule 7R00022 measure the distance between the bulkhead and face of the straightedge which is against the tail flange. Measurements are to be made at the five points as shown in sketches. Ensure that measuring rule is positioned at 90 degrees to the straightedge while the measurements are made. The actual measurement, at each point (1 through 5), should not be less than 15-15/16 inches.

Report to NAVMINENGRFAC number of units screened and the number of failures, if any. Include serial numbers for units that fail screening criteria. Reports to be submitted upon completion of screening segments established at local level.

MINE DESIGN AND DEVELOPMENT

PART II: World War II

Underwater mine design and development added new dimensions to mine warfare at the outbreak of World War II. The influence mine coupled with the use of the submarine and airplane as mine layers suddenly made the mine important as an offensive weapon.

Up until 1939 the mine as a fleet weapon was limited to destroyers equipped with mine tracks. The surface-laid mine Mk 6 was looked upon primarily as a defense weapon although, offensively, destroyers could dash into a combat area and, relying on surprise and speed, escape attack. The success of such a maneuver was demonstrated by the fact that surface craft did lay 1,829 mines in offensive fields in the war without the loss of a single ship.

Ordnance was now faced with interface considerations and no longer could play a lone hand in directing mine development. The Mine Warfare Section of the Office of the Chief of Naval Operations was now the Navy's top mine warfare organization. The surface-laid mine was not new but the air-laid mine was. To a lesser degree so was the sub-laid mine. Newer type subs were designed to lay mines from a 21-inch torpedo tube but sub crews were still to be indoctrinated in mine use and handling.

Great Britain and Germany had outpaced the U.S. in mine warfare, so Ordnance and CNO representatives went to England to profit by experience gained in the first years of the war. All who made the trip returned as mine warfare missionaries.

Another step in developing Navy mine warfare skills was promoted by a small group at the Naval Ordnance Laboratory who met, usually in the evening, and played a "mine-warfare game." This group developed into a Mine Operational Warfare Research Group so effective that it was moved to the BUORD and finally to the Office of the Chief of Naval Operations.

The air-laid mine concept was suffering growing pains. The Bureau of Ordnance had an air-laid version of the Mk 12 but neither Navy or Air Force pilots were trained in this aspect of warfare. The Navy did not then have aircraft suited to carry on a sizeable aircraft mining campaign. Its aircraft operated mostly from carriers and could carry but one or two mines at a time. For the type of mining campaign which was proposed against Japan, the Air Force had to be "sold" on the use of mines. Early in 1942 representatives of the Mine Warfare Section discussed with the Air Force the effectiveness of aircraft mine warfare as it had been demonstrated in Europe. As a result the Air Force sent aviators to the Navy's Mine Warfare School at Yorktown, and established mine warfare courses in the Air Forces School of Applied Tactics at Orlando.

The Section also sent mine liaison officers to the Central Pacific, South Pacific and Southwest Pacific Commands, and groups of expert mine designers and mine technicians were established in Pacific areas. Their responsibility was to finally prepare each mine as a piece of "fixed ammunition" for planting. They were, in effect, the first MDAUs.

Meanwhile the Bureau of Ordnance was not idle. By 1945 the designers were working on a Mk 45 mine. Mines released for service use in World War II Were:

Mark 6--Antenna type mine developed during WWI.
Mark 10--Cylindrical sub-laid mine.
Mark 12--Cylindrical sub- and air-laid mine.
Mark 13--Air-laid magnetic mine.
Mark 16--Antenna-type mine, case larger than Mk 6.
Mark 18--Magnetic bottom mine, surface-laid.
Mark 19--Air-laid drifting mine.
Mark 23--Surface-laid minesweep destructor.
Mark 25--Large air-laid bottom mine.
Mark 26 and 36--Small air-laid bottom mines.

Before Pearl Harbor the Navy had started defensive mining projects, but extensive destruction by the Japanese diverted fleet units to other duties and no offensive mining was undertaken until 8 months after Pearl Harbor. The first offensive fields were laid by destroyers in August 1942 and by submarines in October and November 1942. American aircraft laid their first mines (British) in February 1943 and the first U.S. air-laid mines used in the Pacific were laid by U.S. aircraft in March 1943. The first U.S. mine to be dropped in World War II was the Mk 13 dropped in the Mediterranean by British aircraft.

All these veteran mines of World War II are more or less familiar to today's minemen with the possible exception of the Mk 12, Mk 13, Mk 19, and Mk 26. A Mk 12, however, was recovered from Japanese waters near Nagoya in 1969 (see Troubleshooter 4-70 p.3). The Mk 13 was originally designed to serve both as an induction-type mine and, when equipped with a nose fuse, as a bomb. Later it was redesigned as the Mk 26 Mod 1 with a parachute. The Mk 19 was a drifting mine, known as an oscillating mine. It w designed to be laid in rivers, harbors and anchora The Mk 26 Mod 1 gave way to the Mk 36 with a larger explosive charge.

The Mk 11 is not included in the mines on hand for World War II because of its special design for use with the 40-inch tubes of the mine-laying sub, the Argonaut. This submarine, the only one of its kind in the U.S. Navy made many successful practice plants but laid no service mines and early in the war was converted to a submarine cargo carrier minus mine handling gear. It was sunk by the Japanese.

The principal arena for U.S. Navy's mine warfare in World War II was the Pacific. The nature of the pattern of the campaign against the Japanese was ideal to prove the effectiveness of American mines. How effective the mine fields were is summarized by Dr. Robert C. Duncan's American Use of Sea Mines:

"Nearly 31,000 mines were laid in the Pacific Ocean, Indian Ocean, and in waters of Asia and Japan, primarily against the Japanese. Nearly 8,000 of these were in defensive fields where they served their purpose in preventing hostile craft from operation in the area, but so far as is known, sank no ships. The 23,000 offensive mines resulted in the sinking or serious damaging of 1,075 Japanese ships, both naval and commercial, with a total shipping tonnage of approximately 2,289,000 tons.

"Overall, the Japanese lost one ship to every 23 mines. Japanese recorded losses were:

Air-laid--1 ship for every 21 mines.
Sub-laid--1 ship for every 12 mines.
Surface-laid--1 ship for every 250 mines.

"The losses of the U.S. Command were almost inc sequential. It lost no surface craft, no submari and but 57 aircraft. The low cost is phenomenal-- aircraft for every 20 enemy ships lost. It merely proves again the efficacy of mine warfare in which mines can be planted when the enemy is not there."